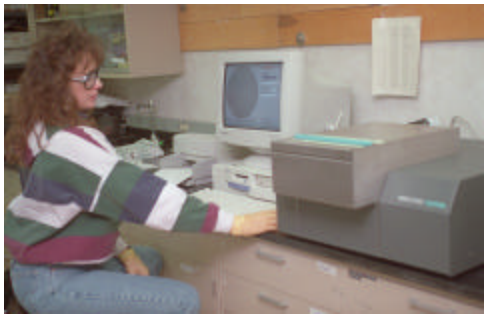

SPECTRO XEPOS Analyzer

INEEL
Idaho National Engineering & Environmental Laboratory
BECHTEL BWXT IDAHO, LLC

Technology Demonstration Summary Sheet
SPECTRO XEPOS XRF ANALYZER

THE NEED

The Idaho National Engineering and Environmental Laboratory (INEEL) has a need for analytical equipment capable of detecting Resource Conservation and Recovery Act (RCRA) metals and polychlorinated biphenyls (PCB) in paint, soil, liquid, or smear samples taken during Decontamination and Decommissioning (D&D) activities. Presently, the INEEL and other Department of Energy (DOE) facilities send environmental samples to a contract laboratory for analysis. Contract laboratories provide quality data, but it may take up to 90 days for managers to receive results, at a cost that can exceed $1000 per sample.

THE TECHNOLOGY

The SPECTRO XEPOS X-ray fluorescence (XRF) analyzer, a German technology, uses polarized X-ray fluorescence (XRF) spectrometry to detect elements from sodium to uranium. The XEPOS was also used to detect PCB by using the presence of chlorine ions (Cl^-) as an indicator of the possible presence of PCB. The XEPOS provides simultaneous determination of the elements present in a single measurement that varies from 3 to 10 minutes in length depending upon the data quality objectives. The results can be printed or saved to an electronic file for later use. The cost of the instrument is approximately $65,000. The system can be set up with multiple internal reference standards that are matrix-matched for various media, thus minimizing the need for repetitive calibration.

THE DEMONSTRATION

The SPECTRO XEPOS was demonstrated in November of 1999 at the INEEL on paint, oil, solids, and soil samples. The samples were collected during multiple D&D characterization projects at the INEEL. The demonstration of the XEPOS analyzer took place in the CFA 625 sampling laboratory, where the samples were prepared for analysis. The samples were collected at the Security Training Facility, Idaho Nuclear Technology and Engineering Center, and the Test Reactor Area facilities. Duplicate samples were sent to a contract laboratory for analysis as part of the baseline comparison.

THE RESULTS

The SPECTRO XEPOS XRF analyzer provided results in minutes that correlated well with laboratory results. Because the SPECTRO XEPOS requires only 4 grams of material per sample, sample collectors were able to collect enough material in 15 minutes, even in the most difficult situations. Contract laboratories generally require about 100 grams of sample for each type of analysis (inorganics, PCB, and radionuclides), which results in hours of sampling. Workers were able to minimize exposure do to the smaller amount of sample required for analysis. Generally the SPECTRO XEPOS required less than 10 minutes per sample for analysis while the contract laboratory took up to 90 days to provide the same results. The demonstration was able to reduce costs associated with sample collection and expedite D&D schedules. In addition, both worker exposure and waste generation were reduced. The instrument provided a full characterization of inorganic components ranging from sodium to uranium. The absence of Cl- was used to screen samples for PCB analysis. If Cl- was found, samples were sent to a laboratory to confirm the presence of PCBs. At a cost of $65,000, the SPECTRO XEPOS will provide savings over laboratory analysis after 65 samples, based on $1000 per sample for lab analysis.

BENEFITS

- Provides same day results thus expediting D&D schedules
- As much as 20 times less sample material is needed for analysis
- Significant reduction in worker exposure
- Reduction in analytical costs
- Increase waste minimization efforts

Sample Placement in SPECTRO XEPOS

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